CHEMICAL & ENGINEERING NEWS

C&EN

AUGUST 1, 1994

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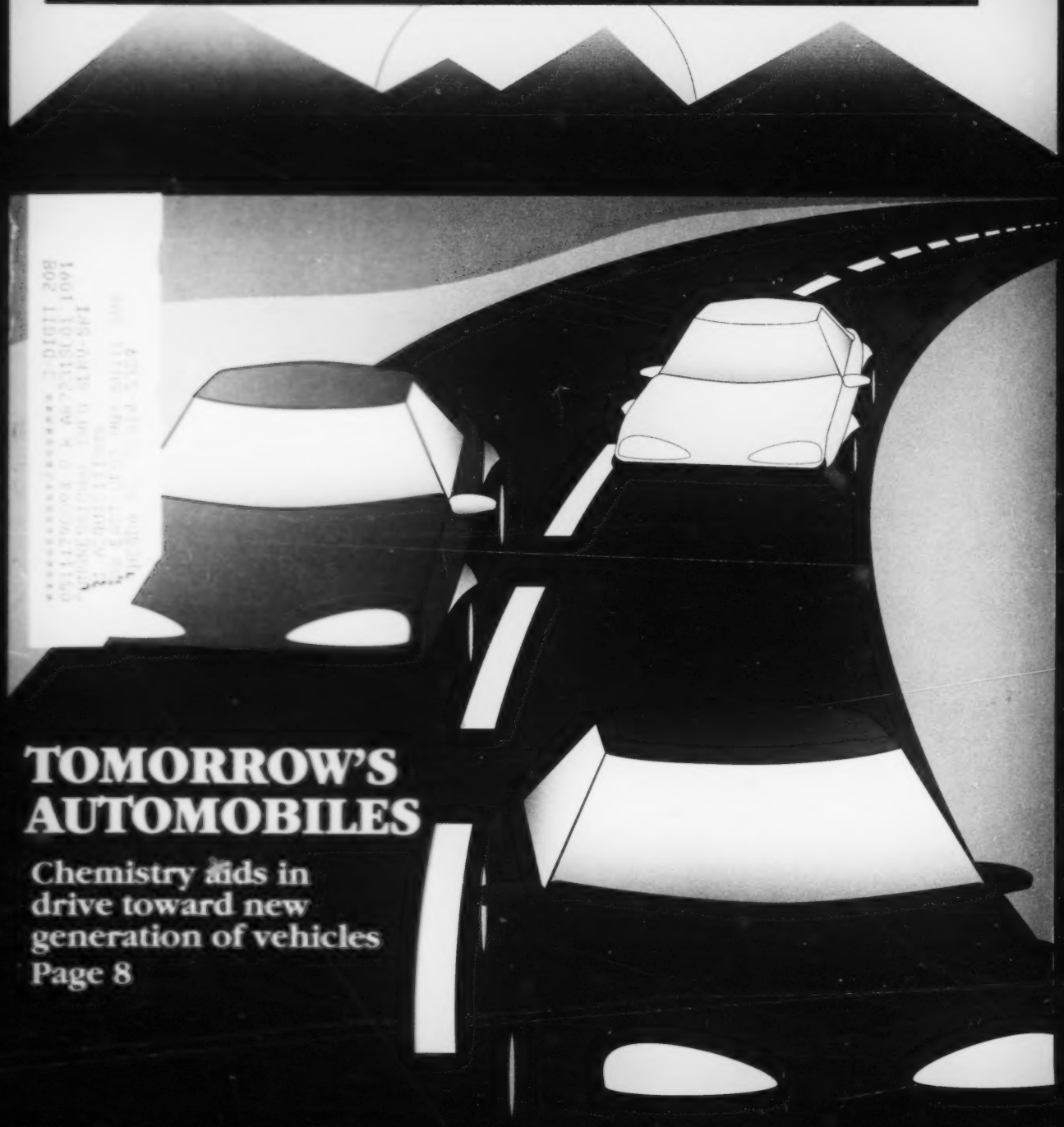
U.S. QUEST FOR BETTER CHEMICAL ARMS DETECTION CONTINUES PAGE 26



TOMORROW'S AUTOMOBILES

Chemistry aids in drive toward new generation of vehicles

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CHEMICAL & ENGINEERING NEWS

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NEWS OF THE WEEK

■ Two independent research groups discover extensive deposits of naturally occurring fullerenes in Canada and New Zealand. **Page 4**

■ Chemical earnings are up again for the second quarter of 1994, helped by cost-cutting measures and productivity improvements undertaken by companies over the past few years. **Page 5**

■ In a landmark case marking the first time the federal government has used the False Claims Act to pursue scientific research fraud, two U.S. universities will pay nearly $1.6 million to settle a case involving charges that a researcher falsified data. **Page 6**

■ Presentations at an international conference suggest that the key to addressing global warming is preventing explosive growth of greenhouse gas emissions from developing nations. **Page 6**

■ Genzyme has acquired BioSurface Technology and merged it into a new business unit focused on tissue repair and wound healing. **Page 7**

■ During record-setting flight of almost 15 days in Earth orbit, space shuttle *Columbia* astronauts perform 81 microgravity experiments in materials and life sciences. **Page 7**

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BUSINESS

Chemical companies that added pharmaceutical businesses in the 1970s and 1980s consider the wisdom of keeping the capital-intensive units in view of today's business strategies. **Page 19**

Business Insights: Analysts watching the performance of biotechnology stocks fear that this year's spring plunge may not be followed by the usual turnaround. **Page 24**

GOVERNMENT

Detectors for chemical warfare agents worked well in the Persian Gulf War, although some alarms are still a puzzle; development of technology continues. **Page 26**

SCIENCE/TECHNOLOGY

Improved synthesis of taxol—and of taxol-like compounds that may show improved antitumor activity—from renewable starting materials is anticipated. **Page 34**

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"The New Alchemists: Breaking Through the Barriers of High Pressure," by Robert Hazen, focuses on diamond synthesis and on the human side of high-level research. **Page 37**

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Group of 1994 Petroleum Research Fund grants approved by ACS Board of Directors commits about one third of the $12.4 million grant budget authorized for 1994. **Page 39**

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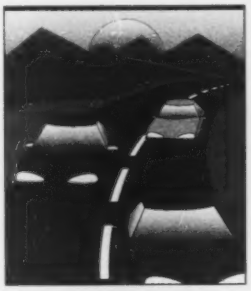

Partnership for a New Generation of Vehicles, which involves the Big Three U.S. automakers and the federal government, looks to develop fuel-efficient, low-emissions vehicles during the next decade. Page 8

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LETTERS

Handheld chemical calculator

Contrary to Douglas E. Wedman's view (C&EN, June 20, page 4), the chemical calculator is not already here. The chemistry calculation capabilities of the HP48SX were well known to us and were cited in the application for the patent recently awarded to us. The uniqueness, as well as the usefulness of our chemical calculator derives from the use of the periodic table to perform the chemical calculations—a feature not found in the HP, nor in any other calculator of which I am aware.

The HP48SX, while having some powerful calculation capabilities, is not for everyone—especially beginning chemistry students—because of its steep learning curve. For example, to enter a chemical formula for the purpose of determining its formula weight, you must turn on the "alpha" mode to select the upper case first letter of the element symbol, then another key to get the lower case second letter. With CHEMiCALC, you just touch the element symbol on the periodic table. (The keys could be "mapped" out as part of the periodic table to do this if our program were incorporated into the HP.)

The potential effectiveness of my chemical calculator as a learning tool has been tested in some dozen high schools in the U.S. and Canada as part of a National Science Foundation Small Business Innovative Research (SBIR) program Phase I feasibility study. Unfortunately, because the Phase II proposal reviewers share many of Wedman's perceptions, the Phase II research designed to test out the effectiveness of a handheld chemical calculator in schools was not deemed significant enough for support.

Prototypes of the handheld chemical calculator/computer already under development or being considered for incorporation into calculators such as the HP, will be demonstrated at the American Chemical Society meeting in Washington, D.C., this August.

Bert Ramsay
Chemical Concepts Corp.
Ann Arbor, Mich.

The glowing future for the handheld chemical calculator, which was predicted by O. Bertrand Ramsay and David W. Brooks (C&EN, May 16, page 50), may eventually materialize, but initially—Gentlemen, temper your enthusiasm!

Ramsay makes the guarantee "that five years from now every chemist and chemistry student is going to be walking around with one of these ... computers." Brooks suggests, "These devices are going to become so commonplace that students who don't have them are going to be at an extreme disadvantage." Perhaps they should recall Glenn Crosby's revelation about the state of affairs of computer use in secondary-level science education (C&EN, Sept. 21, 1992, page 28). Many of us still do not have ready access to a computer and future access is not imminent.

If one is teaching in a locale that operates within mandated fiscal parameters, the latest innovation from the "silicon tower" of research is certainly more than five years away from acquisition for the teacher's desk. One should probably not even consider acquisitions for the student's desk. For numbers of us, the maintenance of our science programs and a slow but trying advance are more important than a "hot" technological device.

The article notes that the handheld chemical calculator is intended primarily for high school students. Is the handheld chemical calculator a device that is truly needed? Have chemical calculations changed so much that our students need to be moved, during the next five years, away from their low-cost but effective periodic tables and simple calculators? Might students be in an equally secure calculating position if they acquired an old Keuffel & Esser No. 4160 from an estate sale, flea market, or garage sale?

The ACS "ChemCom" curriculum program has demonstrated Brooks' claim that one can get a foundation in chemistry without going through the old hoops. However, his assertion about students being at an extreme disadvantage without this device is, in reality, an announcement that the acquisition of the device will become a hoop to jump through. Do we need a new hoop? And, will the nature of general, introductory chemistry change so much in the next five years that this device will be the mandate Ramsay and Brooks suggest?

William C. Penker
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Neillsville, Wis.

Correction

• July 18, page 44: The color bar was labeled incorrectly in the image of the sea slug neuron. Colors represent concentrations of cyclic adenosine monophosphate [cAMP], not $[Ca^{2+}]$.

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Chemical Industry Debates Merits Of Operating Pharmaceutical Units

■ ***Wave of acquisitions in 1970s and 1980s gives way to economic realities of focused, lower cost business strategies***

George Peaff,
C&EN Northeast News Bureau

During the end of the 1970s and throughout the 1980s, many companies entered into or acquired a business or businesses with value-added products in fields similar to their own as a hedge against the cyclic commodity products of their core businesses.

In the chemical industry, the trend was to buy into pharmaceuticals. Eastman Kodak, then owner of Eastman Chemical, bought Sterling Drug; Rhône-Poulenc put its drug operations together with Rorer Group; Monsanto obtained G. D. Searle; and Dow Chemical pieced together Marion Merrell Dow.

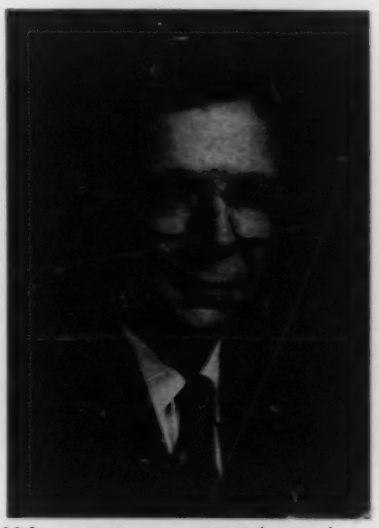
Each company had specific reasons to make the deals, but the common driving force was diversification to protect themselves from the cyclicality of their core operations, which were, and still are, determined by the rise and fall of economies, both local and global. U.S. companies seemed to be adopting the long-standing strategy of European business, especially Germany's major chemical producers.

Synergies exist between chemicals and pharmaceuticals: both are made through the manipulation of molecules, with chemicals being transformed to make other chemicals or pharmaceuticals. Pesticides, herbicides, and pharmaceuticals are highly evolved chemicals that have the ability to control biological activity. Before embarking into drug development, Dow Chemical and Monsanto had vast experience in pesticides and herbicides.

But the diversification craze in the 1970s and 1980s has been transformed in the 1990s into a trend toward focusing operations, cutting costs, and increasing productivity. Growth from offering new, value-added products and upward pricing has been replaced by growth through increasing market share, becoming the low-cost producer, and going overseas to new markets, often through joint ventures.

Producing and selling chemicals seemed to be at odds with producing and selling pharmaceuticals, despite the similarities. With the emergence of managed health care—cost containment—in the U.S., the ability to increase prices for pharmaceuticals has been drastically reduced, making it extremely difficult for companies to recoup their R&D investment.

According to one senior pharmaceutical executive, pharmaceuticals were a "natural marriage" for chemical makers such as Dow and Monsanto because the firms had an understanding of the technology and manufacturing process. And in the case of Eastman Chemical, at the time of Kodak's merger with Sterling, it claimed to have "had a portfolio of over 500,000 chemical entities that they wanted to screen for human [biological] activity" for potential products, says the pharmaceutical executive.



Mahoney: customers are more price conscious

J. Kent Riegel, president and general counsel for ICI Americas, the Wilmington, Del.-based U.S. subsidiary of U.K.'s ICI, describes the evolution of ICI in the 1960s and 1970s as a company having three segments—specialty chemicals, agricultural products, and pharmaceuticals—with agricultural products and drugs evolving out of ICI's old industrial divisions. Other European companies have long-standing operations in both chemicals and pharmaceuticals, including Bayer, BASF, Ciba-Geigy, Hoechst, Rhône-Poulenc, and Schering, to name a few.

However, from a financial perspective, a telling distinction is seen. "There is a big difference between chemicals and pharmaceuticals," says Paul Raman, vice president and chemical analyst at the New York City office of London-based investment bank S. G. Warburg. "Chemicals are driven by the economy; pharmaceuticals are not economically driven."

ICI became the first major chemical company to divest a major pharmaceutical business, completing the spin-off of Zeneca to its shareholders in June 1993. Economics as well as other factors played a major role in the divestiture. "We took a look at our portfolio in 1991 and 1992 and realized that through development, growth, and acquisition, we had, really, two separate cultures," comments ICI's Riegel, explaining the rationale behind the spin-off.

Biosciences—which are R&D intensive, have customer-specific products, and are focused on fine chemicals manufacturing—became part of Zeneca. And industrial chemicals became the new ICI, a large-volume and capital-in-

tensive business with a heavy emphasis on process technology. "You try to manage these two very distinct cultures and you can't maximize their potential," continues Riegel. "And the other concern we had was that the stock market did not focus on the true value of the two components. 'Is this a chemical company with a large pharmaceutical business or is it a pharmaceuticals company with chemicals?' To give full value to [the opportunity to maximize the businesses' potential], we thought it made a lot more sense to just split them off into two pieces."

In the case of Kodak, its spin-off of Eastman Chemical to Kodak shareholders became only the first step toward a core business strategy. Its pending sale of Sterling Winthrop's prescription drug business to Sanofi S.A. moves the company further toward its goal of focusing on imaging businesses.

According to Charles Smith, vice president and director of communications at Kodak's health care segment, the company in the sixties and seventies had a strong position in health care with x-ray film products and equipment. By 1980, the company had commercialized blood analyzers and clinical diagnostics. As that business grew, by the mid-eighties, Kodak management made the decision to pursue an acquisition in the pharmaceutical field based on three areas in which the company had expertise: marketplace know-how in the health care industry, a commitment to fund and manage a large R&D program, and a deep understanding of chemistry and biology.

The health businesses that Kodak is divesting are very solid businesses, says Smith. The businesses are large, profitable, and have contributed solidly to Kodak. But, he continues, "Management is committed to succeeding in a major way in imaging, and in order to do so, it must apply the entire research base and management attention in this company on imaging. Even though [the health care units] are very attractive and well-run businesses generating good returns, they also require, going forward, significant investments."

Smith, who was a manager within Kodak's health care segment at the time of the acquisition, maintains that the merger was not a wrong move for Kodak. "It was absolutely the right thing to do at the time. And if you simply look at the financial reporting stream of the company since 1988, you will see that the health businesses made a very important and very significant contribution to the financial performance of the company."

The eventual divestment of Sterling and other health businesses, which accounted for 32% of Kodak's $16.4 billion in sales in 1993 (excluding sales from Eastman Chemical), will also help reduce its $7.1 billion debt load (as of March 31). Nearly half of this debt remains from the funding for the $5.1 billion acquisition of Sterling in February 1988.

However, others would dispute Kodak's commitment to Sterling from the beginning. "Kodak never should have gotten that company, because it wasn't prepared to invest the time, the energy, and the resources to make it successful," says the senior pharmaceutical executive. "It wasn't interested in understanding the business. [Kodak] thought it would just buy [Sterling, which,] under its own volition, ... would somehow become successful."

Although becoming low-cost producers through cost cutting and productivity initiatives has become a driving force at almost every company regardless of location, U.S. companies have taken the lead in most industries. But as the costs associated with U.S. health care remain hotly debated, Dow and Monsanto appear to be under pressure from their large, institutional investors and Wall Street investment banks to shed their drug segments to a company focused on pharmaceuticals.

Monsanto commenced its tender offer for Searle in 1985, paying $2.7 billion for the business. In 1993, Searle contributed $1.5 billion of Monsanto's $7.9 billion in total sales. Dow Chemical acquired 38.9% of Marion Laboratories for $2.2 billion in August 1989 and combined Marion into its Merrell Dow drug subsidiary in December 1989, forming Marion Merrell Dow (MMD). Dow subsequently has increased its stake in MMD from an initial two thirds to a 72% shareholding now. In 1993, MMD posted sales of $2.8 billion, a 15% decline from 1992.

Warburg's Raman believes that Dow's and Monsanto's drug operations "are worth more to someone who's in the [pharmaceutical] business." He estimates the divestment value per share for MMD and G. D. Searle would be $25 per share, based on the four times book value and two and a half times sales value achieved in the Roche Group's tender offer for Syntex (C&EN, May 9, page 4). As of July 21, MMD's shares were trading at $20 on the New York Stock Exchange.

Raman gives several reasons why both MMD and Searle have not justified their purchase by their parents: key drugs have come off patent, the scale required for the R&D commitment for pharmaceuticals has not been achieved, the R&D pipeline for promising drugs is virtually empty, and no global infrastructure has been installed.

In the case of Dow, it created MMD to market the antihistamine Seldane, taking advantage of Marion's large sales force, says Raman. But with that drug now off patent, Dow should focus on chemicals. As for Monsanto's Searle, its key cardiac drug, Calan, "has already happened," he says. "Under the ideal plan, Monsanto would take biotechnology and revolutionize [agriculture] and drugs." But whereas the NutraSweet portion of Searle (now run independently) has paid for itself, the entire Searle acquisition has not, maintains Raman.

Five U.S. drug firms were formed in past 10 years by major chemical producers

$ Millions	Sales, 1993	Operating income, 1993	Parent/% ownership
Hoechst Celanese[a]	$ 757	$ 17	Hoechst A.G./100%
Marion Merrell Dow	2,818	439[b]	Dow Chemical/72%
Rhône-Poulenc Rorer	4,019	675[c]	Rhône-Poulenc S.A./68%
G. D. Searle	1,546	–13	Monsanto/100%
Sterling Winthrop[d]	1,920	na	Eastman Kodak/ 100%[e]

a U.S. sales and operating income for all the company's life science activities, including Hoechst Roussel's pharmaceuticals, Hoechst Celanese's crop protection and animal health products, and 51% stake in Copley Pharmaceutical, acquired November 1993. b Reflects $180 million restructuring charge. c Reflects $194 million restructuring charge and $105 million gain from litigation settlement. d Prescription pharmaceutical sales only. e Sale pending to Sanofi S.A. na = not available.

Monsanto's chairman and chief executive officer, Richard J. Mahoney, addressing shareholders in the company's 1993 annual report, says Monsanto is looking for Searle "to pay its own way" and to meet corporate targets, including the company's 20% return on equity goal. To do so, Monsanto will seek alliances with others to achieve cost savings, gain products, and achieve a larger pharmaceutical market presence.

The company's original strategy behind acquiring a pharmaceuticals operation has not changed, according to Mahoney in a recent interview with C&EN. It was—and is—based on the company's investment in biotechnology for pharmaceuticals, agriculture, and animal sciences beginning in the late seventies as Monsanto continued to move away from highly cyclical and capital-intensive commodity petrochemicals and into higher value chemicals.

The company also saw and still sees pharmaceuticals as "one of the higher value opportunities to upgrade R&D," Mahoney says. "We thought that our research base was biological sciences, which was growing stronger and stronger [and] could be capitalized on in pharmaceuticals. We continue to work through the biological sciences. We haven't had as much come out of research as we would have liked at Searle, but the pipeline now is quite strong and we're very optimistic."

What has changed in the pharmaceutical marketplace, he says, is that the opportunity to introduce a product similar to one already on the market, but with no economic advantage, has disappeared—cost-performance benefits must be there. "Any industrial chemical company is brought up that way," Mahoney states. "The pharmaceutical industry was not. It was brought up on performance: What will [a product] do to improve health? What are the side effects? What level of risk will you take?" In the current marketplace, customers are much more price conscious, "but still willing to pay for innovative products."

As outlined by Mahoney, Monsanto is committed to Searle. "Searle has plenty of capability in R&D in the fields we've chosen. It has very good marketing strength in the U.S. and in a number of countries, but not in all the major countries in the world. We've got a business that can be an attractive part of the company, we're running it as hard and as fast as we can, and we're trying to find alliances to make it even more important. If we don't find selective alliances, I think we are capable of developing as is with smaller alliances, the kind we've been doing right along."

Patterson: generics are a cost-driven business

Although Dow declined to comment on its plans for MMD, in late June, in response to speculation in the financial press, Dow issued a statement saying that it would consider the sale of its stake in MMD, but nothing was pending and the drug company was not being shopped around.

But Warburg's Raman says MMD and Searle would be attractive to pharmaceutical makers—especially European companies—looking to establish or increase their presence in the U.S. Other Wall Street analysts seem to agree with his assessment.

"[They] can't survive as independents," says Barbara A. Ryan, pharmaceutical analyst at the New York City office of Baltimore-based investment bank Alex. Brown & Sons. She foresees both MMD and Searle being sold. Both have some degree of scale, but market share in the managed care arena is necessary, she says, and, with infrastructure and fixed costs still high, both companies are losing to generic competition. She sees little motivation for a U.S. concern to be interested in the two companies, but European companies already with a share of the world market and greater financial resources than their U.S. counterparts would be interested.

Other factors affect the success or failure of combining companies. David Saks, vice president and pharmaceutical analyst at New York City-based investment bank Gruntal & Co., takes the view that the "odds are worse than 50-50" that big mergers will work because of the clash in culture, infrastructure, and industry focus. "Odds don't favor making an acquisition and swallowing it up," he comments, saying small, specialty, and niche mergers have a better chance to succeed. As an example, he cites the different cultures at Kodak and Sterling: Kodak wanted volumes in the millions of gallons range, but Sterling was looking at volumes in pints.

And as described by the senior pharmaceutical executive: "The chemical guys didn't get what they thought they were going to get; they paid big prices and are frustrated now by their inability to get the returns off those investments that they made. It's entirely different for the European guys coming into this market today, knowing what the market presents. [They] already have research capability outside the U.S."

But as some parent firms seek to shed their pharmaceutical segments and smaller drug companies look for ways to grow, other companies, particularly the major European firms, are looking to add to their operations, especially as the dollar keeps declining against the other major currencies, the German mark and Japanese yen primarily. The best example is Switzerland-based Roche Group, the owners of Hoffmann-LaRoche, which is in the tender offer process to acquire California-based Syntex for $5.3 billion.

Hoechst Celanese, the U.S. unit of Germany-based Hoechst A.G., having already decided to expand its presence in the U.S. pharmaceutical market, acquired a 51% stake in Copley Pharmaceutical, a generic drugmaker, for $546 million in November 1993. In 1993, Hoechst Celanese ended the year with sales of $6.9 billion, with its life sciences segment, including pharmaceuticals, contributing $757 million in sales.

Joseph H. Patterson, Hoechst Celanese's deputy chairman, diagrams the company's entrance into the generic side of the pharmaceutical business. Similarly, MMD entered further into

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generics in June 1993 with the acquisition of the generic drug business of the Rugby-Darby Group. In the 1970s, he says, pharmaceuticals were "a very fertile research field and the total market expanded because there were new compounds for therapeutic areas that had [no treatments available]. You're now down to a very small number of therapeutic areas that don't have [at least one treatment].

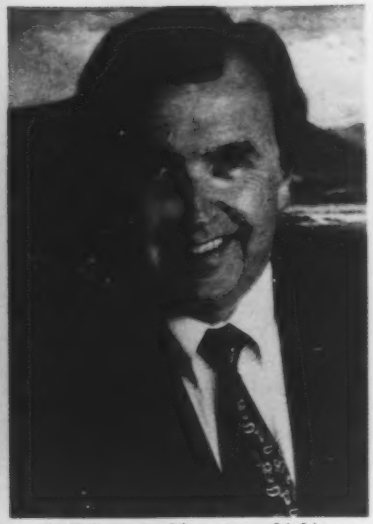
"Generics are a natural movement of that 1970s rich, fertile area to the next stage," he continues. Because patents run out, "generics come in and fill the bill." Patterson cites that between now and 1997, "a significant number" of compounds will be coming off patent and going generic, with the generic industry likely growing 12 to 14% over that time frame and the "branded industry" remaining flat.

Generics will be a cost-driven business. "There is no research arm to this, there's a development arm, a formulation arm," says Patterson. In a mature generic drug market, like the U.K. or Germany, generics behave like commodity products. "You have a small number of players, two or three [firms that] have large shares and others have niches," says Patterson.

For Hoechst Celanese, the Copley stake will help to increase its share in the U.S. pharmaceutical market and more closely match its parent's fourth largest ranking in the worldwide drug market, says Patterson. "We don't have a position in the U.S. that reflects our worldwide strength. We believe because of the position of the generic business, and its impending consolidation and growth, that we can play a much larger role in generics than we have been able to play thus far in branded pharmaceuticals here. Furthermore, we've got some significant strengths in chemicals that allow us to make bulk active [ingredients]."

Patterson sums up a prevailing belief about the changing nature of the pharmaceutical industry. "It is not easy to either build or manage the expertise that is required to be successful in the pharmaceutical business today, because discovery is one piece of it—but development has become a significantly bigger piece."

Rhône-Poulenc's position in pharmaceuticals recently came under scrutiny because of the misinterpretation of a recent filing with the Securities & Ex-



Neff: firms need long-term thinking

change Commission (SEC). Rhône-Poulenc Rorer, the U.S. pharmaceutical unit owned 68% by French-based Rhône-Poulenc, saw its stock take a roller-coaster ride in June. In the early part of the month, investors drove the stock price up 10%, thinking Rhône-Poulenc was going to raise its stake in Rhône-Poulenc Rorer. Days later, after Rhône-Poulenc said it had no immediate intention to raise its Rhône-Poulenc Rorer stake, investors sold off the previous gain.

Rhône-Poulenc combined its pharmaceutical business with U.S.-based Rorer Group to form Rhône-Poulenc Rorer in July 1990. The recent SEC filing and the actions surrounding it involve the merger agreement between Rhône-Poulenc and Rhône-Poulenc Rorer's minority shareholders. In the filing, Rhône-Poulenc revealed it had the option to acquire more shares in Rhône-Poulenc Rorer—despite a seven-year standstill agreement it pledged to keep as part of the merger deal—if it gained approval from two of the three outside directors on Rhône-Poulenc Rorer's board.

The previously undisclosed option led to speculation that Rhône-Poulenc was considering a change in ownership position at Rhône-Poulenc Rorer. But Rhône-Poulenc has stressed that the amendment as part of the filing gives the company "normal flexibility in day-to-day management."

"We want to be in chemicals, and we want to be in life sciences, and we define life sciences as pharmaceuticals, animal health and nutrition, and agricultural chemicals," says Peter J. Neff, president and chief executive officer of Rhône-Poulenc Inc., the Princeton, N.J.-based U.S. subsidiary of Rhône-Poulenc. He says a similar strategy has driven all of Rhône-Poulenc's acquisitions over the years—"enhancing and rebalancing the geographic presence in different parts of the world."

Synergies exist between the different businesses in Rhône-Poulenc, according to Neff. "It pays to be in chemistry, [to] maintain those core skills of chemical synthesis and process chemistry married with the pharmaceutical market. As we go on in time, we think that some of the genetic manipulation skills that we have now in pharmaceuticals will translate back to the chemical industry."

Rhône-Poulenc intends to be 50% in chemicals and 50% in life sciences, states Neff. But the R&D commitment to life sciences—13 to 14% of sales—exceeds that to chemicals—4 to 5% of sales—because "the lifeblood of the life sciences industry is corporate research coming up with new products."

Neff points out that companies must look to the long term, not short term. "Many leaders of companies get caught up in the analysts' expectations of what a company should be, and by definition, that drives short-term thinking because the analysts are interested in quarterly results. [A company] succeeds or fails based on maintaining a robust strategy and having the skills to implement that strategy over a long period of time."

Companies may have lost sight of long-term goals in the 1980s, says Neff, but have returned to long-term thinking in the 1990s. And who owns stock in a company may also be a factor. "The stock ownership in Europe tends to be much more by large banks and large insurance companies, which by nature have a long-term view. In the U.S., you have mutual fund companies and individual investors who tend to be more short-term focused." □

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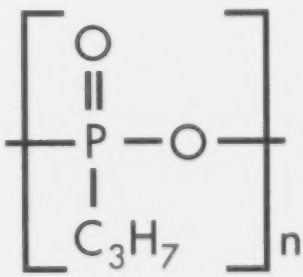

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Group Of 1994 Petroleum Research Fund Grants Approved by Board

The ACS Board of Directors has approved 137 new or continuing ACS-Petroleum Research Fund (PRF) grants for fundamental research or scientific education, plus 29 supplements to existing grants for Summer Research Fellowships to benefit faculty from four-year colleges. These grants, committing $4,509,689 of the $12.4 million authorized for 1994, were recommended from the 544 proposals considered by the PRF Advisory Board.

The 1994 PRF grant budget has been reduced in response to the continuing lower yield from investments. The low success rate of just over 20% for Type AC proposals is not satisfactory for applicants nor for the PRF Advisory Board. Further reduction in the 1995 PRF grant budget is anticipated.

Information and application materials may be obtained from the Petroleum Research Fund, American Chemical Society, 1155—16th St., N.W., Washington, D.C. 20036; phone (202) 872-4481.

ACS-PRF Grants for Fundamental Research in the Petroleum Field (Type AC)

Stephen P. Altaner, U of Illinois, Urbana-Champaign. Mechanism of Smectite Illitization in Bentonite: Analysis of Mixed-Layer Illite/Smectite in Cretaceous and Devonian K-Bentonites. $50,000

Hans G. Ave Lallemant, Rice U. Geochronologic Constraints for the Serrana del Interior Foreland Fold and Thrust Belt, North-Central Venezuela. $50,000

Anna C. Balazs, U of Pittsburgh. Determining the Behavior of Copolymers at Penetrable Interfaces through Modeling and Simulation. $37,500

Jayanth R. Banavar, Pennsylvania State U. Phase Transitions in Porous Media. $50,000

Robert A. Beaudet, U of Southern California. Rovibrational Spectroscopy of Open-Shell van der Waals Molecules. $50,000

Ali Borhan, Pennsylvania State U. Motion of Drops through Periodically Corrugated Capillaries at Low Reynolds Numbers. $50,000

William J. Brittain, U of Akron. Synthesis of NLO Polycarbonates via the Ring-Opening Polymerization of Macrocyclic Prepolymers. $50,000

David S. Chapman, U of Utah. Relationships between Tectonics, Temperature, and Hydrocarbon Generation and Migration in the Taranaki Basin, New Zealand: A Comprehensive and Evolving Study. $47,636

Paulette Clancy, Cornell U. Early Stages of Crystal Nucleation and Growth in the Processing of Metals. $50,000

Edward L. Clennan, U of Wyoming. Reactions of Singlet Oxygen with Sulfenyl Derivatives. $50,000

Jeffery L. Coffer, Texas Christian U. Correlating Surface Chemistry and Structure in Porous Silicon. $50,000

David F. Coker, Boston U. Nonadiabatic Reaction Dynamics in Solution. $50,000

Joshua M. Deutsch, U of California, Santa Cruz. Design of Copolymeric Materials. $50,000

William R. Dolbier Jr., U of Florida. Torquoelectronic Effects in Pericyclic Reactions. $40,000

Luis Echegoyen, U of Miami. Fullerenes, Fulleroids, and Fullerides: Electrochemistry, ESR, and Supramolecular Complexation. $50,000

M. Samy El-Shall, Virginia Commonwealth U. Cluster Polymerization Catalyzed by Gas-Phase Metal Cations. $50,000

John E. Ellis, U of Minnesota. Syntheses and Chemistry of Anionic Bis(Arene) Metal Complexes. $50,000

Thomas W. Engel, U of Washington. Atomic-Level Structure of TiO_2 Determined with UHV, STM, and AFM. $50,000

Frank G. Ethridge, Stanley A. Schumm, Colorado State U. 3-D Facies Architecture of the Aggrading, Braided Niobrara River, a Modern Analog for Braided Fluvial Deposits that Host Significant Hydrocarbon Resources. $50,000

John W. Faller, Yale U. Asymmetric Catalysis with Chiral Transition-Metal Organometallics. $50,000

Erik J. Fernandez, U of Virginia. Magnetic Resonance Imaging Analysis of Viscous Fingering. $50,000

John H. Frederick, U of Nevada, Reno. Molecular Gyroscopes: A Study of the Interactions between Methyl Rotors and Molecular Rotation. $50,000

Robert E. Gawley, U of Miami. Properties and Synthetic Applications of α-Amino and α-Alkoxy Organolithiums. $50,000

Harry W. Gibson, Virginia Polytechnic Institute & State U. New Approaches to Polymeric Ketones. $37,500

Andrew Hajash Jr., Texas A&M U. Porosity Modification in Sandstone Reservoirs: Effects of Organic Acids. $47,940

Luke Hanley, U of Illinois, Chicago. Growth of Thin Film Plasma Polymers by Molecular Ion Beam Epitaxy. $50,000

Timothy P. Hanusa, Vanderbilt U. Organometallic Compounds of the Alkaline-Earth Metals as Reagents in Synthetic and Materials Chemistry. $50,000

Joseph A. Heppert, U of Kansas. Transition-Metal Complexes Containing Highly Tunable Hydrogen Bonds: Reactivity and Applications in Molecular Design. $50,000

John F. Hershberger, North Dakota State U. Infrared Laser Studies of Nitrogen Combustion Chemistry. $50,000

David R. Heskett, U of Rhode Island. Structure of Molecules on Metal Surfaces Investigated with X-ray Standing Waves. $50,000

Steven Holdcroft, Simon Fraser U. Photoimaging of Novel Photolabile Electronically Conducting Polymers. $50,000

Zhibing Hu, U of North Texas. Volume Phase Transition and the Mechanical Properties of Polymer Gels. $50,000

Ian E. Hutcheon, U of Calgary. Origin of H_2S in Sedimentary Fluids and Its Effect on the Diagenesis of Clastic and Carbonate Rocks. $50,000

James T. Hynes, U of Colorado. Theoretical Studies of the Energetics and Dynamics of Acid Ionization at Ice-Air and Water-Air Interfaces. $50,000

Bart Kahr, Purdue U. Desymmetrization Strategies in Mixed Crystals of Simple Isomorphous Salts. $50,000

Miriam Kastner, U of California, San Diego. Marine Barite: A Potential Recorder of Oceanic Productivity. $50,000

Kerry R. Kelts, U of Minnesota. Models for Carbon and Oxygen Isotope Trends of Holocene Carbonate Lacustrine Sequences from the Northern Great Plains, U.S.A. $49,980

Paul D. Kleiber, U of Iowa. Chemical Dynamics of Metal Ion-Molecule "Half-Collisions." $50,000

Stephen J. Klippenstein, Case Western Reserve U. Theoretical Studies of Organometallic Reaction Dynamics. $50,000

Jacqueline Krim, Northeastern U. Dynamic Scaling of Self-Affine Fractal Surfaces. $50,000

Stephen Lee, U of Michigan. Predicting Intermetallic Structures and Superstructures. $50,000

Lance L. Lobban, U of Oklahoma. Catalysis by Surfactant Aggregates Adsorbed on High-Surface-Area Supports. $50,000

Stephen J. Loeb, U of Windsor. Molecular Recognition via Simultaneous First- and Second-Sphere Coordination. $50,000

Fred T. Mackenzie, U of Hawaii, Manoa. Dolomite Precipitation Kinetics: The Role of Temperature and Solution Composition. $50,000

James M. Mayer, U of Washington. Oxidation of Alkanes and Arylalkanes by Transition-Metal Oxo Complexes. $50,000

Roberto D. Merlin, U of Michigan. Raman Scattering by Spin-Pair Excitations in Layered Antiferromagnets at High Pressures. $49,965

Jeffrey S. Moore, U of Illinois, Urbana-Champaign. Modular Building Blocks with Conformational Bistability. $50,000

Joseph M. O'Connor, U of California, San Diego. Diazocarbonyl Reactivity toward Alkyne Complexes: Metallacyclobutenes as Reactive Intermediates. $50,000

Robert G. Parr, U of North Carolina, Chapel Hill. Density Functional Theory of the Maximum Hardness Principle, the HSAB Principle, and Aspects of Catalysis. $50,000

Daniel J. Pasto, U of Notre Dame. Study of the Regio- and Stereoselectivity of the Addition of Reactive Intermediates to Chiral Allenes. $50,000

Mark A. Person, Hans-Olaf Pfannkuch, U of Minnesota. Geostatistical Models of Long-Range Oil Migration: An Example from the Paris Basin, France. $49,953

Peter Pfeifer, U of Missouri, Columbia. Wetting Transitions on Fractal Surfaces. $50,000

Gary J. Pielak, U of North Carolina, Chapel Hill. Osmolytes and Protein Amide Proton Exchange. $40,000

Daniel H. Rothman, Massachusetts Institute of Technology. Discrete Three-Dimensional Multiphase Fluids for Efficient Numerical Investigation of Effective Transport Properties. $50,000

David S. Rumschitzki, City U of New York, City C. Effect of Pore Corrugation on Liquid-Liquid Displacements with Application to Oil Recovery. $50,000

Zoltan A. Schelly, U of Texas, Arlington. Electroporation of Unilamellar Surfactant Vesicles. $50,000

Richard D. Sheardy, Seton Hall U. Thermodynamic Studies of DNA Oligomers with Unusual Structures. $50,000

Robert S. Sheridan, U of Nevada, Reno. Photochemical Generation of Low-Spin Carbenes, Bis-Carbenes, and Biradicals. $50,000

Everett L. Shock, Washington U. Co-Transport of Metals and Organic Compounds during Diagenesis and Hydrothermal Processes: N-, P-, and S-Bearing Ligands. $50,000

Rudy L. Slingerland, Pennsylvania State U. Significance of Downstream Fining in Ancient Fluvial Deposits. $47,215

Gary J. Snyder, U of Chicago. Study of the Thermochemistry of Organic Transients by Photoacoustic Calorimetry. $50,000

Julian Talbot, Purdue U. Transport of Molecular Fluids in Porous Media. $50,000

Christian P. Whitman, U of Texas, Austin, C of Pharmacy. Mechanistic Studies of Isomerases Involved in the Microbial Degradation of Aromatic Hydrocarbons. $50,000

ACS-PRF Grants for Fundamental Research in the Petroleum Field (Type B)

James C. Barborak, U of North Carolina, Greensboro. Design of New Alkene/Carbon Monoxide Copolymer Architectures Using Palladium Catalysts. $25,000

Ronald J. Duchovic, Indiana U-Purdue U, Fort Wayne. Molecular Dynamics: Chemical Kinetics and Potential Energy Surfaces. $25,000

Larry G. French, Saint Lawrence U. Temporary Tether Diels-Alder Reactions Relying on Boron-Based Weak Links: Exploiting Removable Connecting Chains To Afford Intermolecular Diels-Alder Products Intramolecularly. $25,000

Jennifer Z. Gillies, Siena C. Spectral Characterizations of Transient Organosulfur Compounds and van der Waals Complexes by Pulsed Beam Supersonic Jet Fourier-Transform Microwave Spectroscopic Techniques. $25,000

Thomas H. Giordano, New Mexico State U. Experimental and Theoretical Studies of Calcium and Magnesium Organic Complexing under Hydrothermal Conditions. $25,000

David E. Hansen, Amherst C. Use of Torsionally Distorted Dipeptide Mimics To Elicit Antibody Proteases. $25,000

Mariusz Kozik, Canisius C. Carbon Dioxide Activation by Heteropoly Complexes in Nonpolar Solvents. $25,000

Jane V. Z. Krevor, San Francisco State U. Synthesis, Electrochemistry, and Nuclear Magnetic Resonance Spectroscopy of a New Series of Heterobimetallic Complexes. $25,000

Chriss E. McDonald, Lycoming C. Reductive Cleavage of Vicinal Monoprotected Diols. $25,000

Keith H. Meldahl, Oberlin C. Taphonomy and Time-Averaging of Molluscan Assemblages in a Rift Basin: Tectonic and Paleoecologic Implications. $25,000

Dorothy J. Merritts, Franklin & Marshall C. Late Quaternary Crustal Deformation and Surface Uplift in the Banda Arc Collision Zone, Indonesia. $25,000

Donald P. Poe, U of Minnesota, Duluth. Efficiency in Supercritical Fluid Chromatography. $25,000

John M. Risley, U of North Carolina, Charlotte. Synthesis of Substrate Analogs To Obtain an Energetic Fingerprint of the Active Site of Aspartylglucosaminidases. $25,000

Thomas J. Smith, Kalamazoo C. Comparative Electron-Transfer Studies on Vanadium and Molybdenum Complexes. $25,000

Leonard J. Soltzberg, Simmons C. Mechanism of Crystal Dendrite Formation. $25,000

Kenneth L. Stevenson, Indiana U-Purdue U, Fort Wayne. Exciplexes in the Photolysis of Inorganic Coordination Complexes. $25,000

Nivaldo J. Tro, Westmont C. Adlayer Structure and Desorption Kinetics of Alkanes Adsorbed on $Al_2O_3(0001)$. $25,000

Daniel R. Willey, Allegheny C. Equilibrium Pressure Broadening and Energy Transfer Studies, 2–100 K. $25,000

Viktor V. Zhdankin, U of Minnesota, Duluth. Preparation and Study of Organic Derivatives of Xenon(II). $25,000

ACS-PRF Grants for Fundamental Research in the Petroleum Field (Type G)

Awarded to faculty in Ph.D.-granting departments

Jonathan P. D. Abbatt, U of Chicago. Laboratory Studies of OH, HO_2, and ClO Heterogeneous Chemistry on Sulfuric Acid Surfaces. $20,000

Roderick W. Bates, U of North Texas. Transition-Metal-Mediated Cyclization Reactions. $20,000

Valerie Daggett, U of Washington. Molecular Dynamics Simulations of Ubiquitin in Methanol. $20,000

John R. Dorgan, Colorado School of Mines. Grafting Polymer Chains to Solid Surfaces. $20,000

Judith L. Eglin, Mississippi State U. Oxidative Addition of Chlorinated Hydrocarbons to Quadruply Bonded Ditungsten Complexes. $20,000

Gregory C. Fu, Massachusetts Institute of Technology. Directed, Metal-Catalyzed Reactions. $20,000

Daniel K. Holm, Kent State U. Assessing Vertical Axis Rotations in Large-Magnitude Extensional Regimes: A Case Study of the Black Mountains, Death Valley Extended Terrain, California. $20,000

William S. Jenks, Iowa State U. Photochemistry of Aromatic Sulfoxides. $20,000

Deborah A. Kallick, U of Minnesota. Structure and Dynamics of a Peptide-Lipid Complex Using Nuclear Magnetic Resonance Spectroscopy. $20,000

Brian B. Laird, U of Kansas. Localized Vibrations and Spectral Diffusion in Glasses. $20,000

Cynthia K. Larive, U of Kansas. Probing the Relationship between Structure, Aggregation, and Conformation in Model Peptides. $20,000

James W. Leahy, U of California, Berkeley. Novel Electron-Deficient Systems: Preparation of Unique Nonclassical Organic Cations and Radicals. $20,000

Nancy E. Levinger, Colorado State U. Probing the Role of Vibrational Relaxation on Chemical Reaction Dynamics. $20,000

Mian Liu, U of Missouri, Columbia. Thermal-Rheological Modeling of Crustal Shortening and Extension. $20,000

Jianping Lu, U of North Carolina, Chapel Hill. Novel Properties of Fullerenes and Related Materials. $20,000

En Ma, Louisiana State U. Self-Propagating Explosive Chemical Reactions in Submicron Multilayer Thin Films. $20,000

George C. McBane, Ohio State U. State-to-State Dynamics of the Reactions of $O(^3P)$ with Acetylene, Formaldehyde, and Methane. $20,000

Robin L. McCarley, Louisiana State U. Probing Metal-Adsorbate Interactions with Scanning Probe Microscopy. $20,000

Fernando J. Muzzio, Rutgers, State U of New Jersey. Using Mixing To Enhance Selectivity and Minimize Waste in Reactive Systems. $20,000

David T. Pierce, U of North Dakota. Structurally Perturbed Electron Transfer in Pendent-Macrocycle Complexes. $20,000

Bradley B. Sageman, Northwestern U. Investigation of Skeletal Limestone Deposits in the Greenhorn Cyclothem: Paleoenvironmental Implications and Sequence Stratigraphy. $20,000

T. Daniel P. Stack, Stanford U. Sterically Encumbered Chalcogenide Ligands: Hydrogenase Models and Beyond. $20,000

Ya-Ping Sun, Clemson U. Photophysics and Photochemistry in Supercritical Fluids and Mixtures. $20,000

Sally J. Sutton, Colorado State U. Altered Zircons in Modern Sands as a Tool for Interpreting Ancient Sandstones. $20,000

Iwao Teraoka, Polytechnic U. High-Yield Fractionation of Polymers by Nanoscale Porous Materials. $20,000

Joseph P. Woods, U of Nebraska, Lincoln. Magnetization and Chemisorption on Bimetallic Ferromagnetic Surfaces. $20,000

Ziling B. Xue, U of Tennessee. New Molecular Routes to Early-Transition-Metal Silicides. $20,000

Gordon T. Yee, U of Colorado. Design, Synthesis, and Characterization of Novel Magnetic Molecular Solids. $20,000

Arun Yethiraj, U of Wisconsin, Madison. Polymer Melts and Blends: Bulk Phase Transitions and Behavior Near Surfaces. $20,000

Lei Zhu, State U of New York, Albany. Cavity Ring-Down Optical Spectroscopy for Studying Atmospheric Carbonyl Reactions. $20,000

Awarded to faculty in non-Ph.D.-granting departments

Barbara A. Bansenauer, U of Wisconsin, Eau Claire. Hydrocarbon Oxidation over Platinum and Palladium: Large Oxygen Coverages. $20,000

Darrell S. Kaufman, Utah State U. Amino Acid Racemization in the High-Molecular-Weight Fraction of Biogenic Carbonate: Chronostratigraphic Applications. $20,000

Elise G. Megehee, Barnard C. New Luminescent Complexes of Rhodium(III) and Iridium(III). $20,000

Julie T. Millard, Colby C. Mechanism of the Carcinogenicity of Epoxide Metabolites. $20,000

Miguel O. Mitchell, Albright C. Total Enantioselective Synthesis of Dihydroflustramine C. $20,000

Christopher J. Pursell, Trinity U. Photo-Induced Chemical Reactions on Amorphous Solid Surfaces with Emphasis on Systems of Atmospheric Interests. $20,000

Silvia E. Ronco, U of South Dakota. Photochemistry of Macrocyclic Copper Compounds Bound to Polyelectrolytes: Photogeneration of Copper Complexes in Unusual Oxidation States. $20,000

ACS-PRF Grants for Fundamental Research in the Petroleum Field (Type SE)

James E. Bauer, Ronald Benner, on behalf of the ACS Divisions of Geochemistry Inc. and of Petroleum Chemistry Inc. Measurement and Reactivity of Organic Materials in Natural Waters at the 207th ACS national meeting, San Diego, March 1994. $2,000

Brian E. Bent, on behalf of the ACS Division of Colloid & Surface Chemistry. Frontiers of Surface Reactivity at the 207th ACS national meeting, San Diego, March 1994. $1,000

Laurie J. Butler, on behalf of the ACS Division of Physical Chemistry. Nonadiabatic Dynamics at the 208th ACS national meeting, Washington, D.C., August 1994. $2,000

Martin Caffrey, on behalf of the ACS Division of Carbohydrate Chemistry. Carbohydrate-Based Liquid Crystals at the 207th ACS national meeting, San Diego, March 1994. $2,000

Tze-Chiang Chung, on behalf of the ACS Division of Polymer Chemistry Inc. Transition Metal Chemistry and Polymerization at the 207th ACS national meeting, San Diego, March 1994. $2,000

Boualem Hammouda, on behalf of the ACS Division of Polymeric Materials: Science & Engineering Inc. Scattering from Polymers at the 208th ACS national meeting, Washington, D.C., August 1994. $2,000

Paul M. Hergenrother, James A. Moore, on behalf of the ACS Division of Polymer Chemistry Inc. Thermally Stable Polymers at the 207th ACS national meeting, San Diego, March 1994. $2,000

David C. Johnson, on behalf of the ACS Division of Inorganic Chemistry. Synthesis, Structure, and Properties of Meta-Stable Compounds at the 208th ACS national meeting, Washington, D.C., August 1994. $2,000

Daniel M. Neumark, William H. Miller, on behalf of the ACS Division of Physical Chemistry Inc. Chemical Dynamics in the Gas Phase at the 207th ACS national meeting, San Diego, March 1994. $2,000

R. Paul Philp, on behalf of the ACS Division of Geochemistry Inc. Reservoir Geochemistry at the 207th ACS national meeting, San Diego, March 1994. $2,000

C. Keith Riew, on behalf of the ACS Division of Polymeric Materials: Science & Engineering Inc. Toughened Plastics: Science & Engineering at the 207th ACS national meeting, San Diego, March 1994. $2,000

James P. Runt, on behalf of the ACS Division of Polymeric Materials: Science & Engineering Inc. Dielectric Spectroscopy of Polymers at the 207th ACS national meeting, San Diego, March 1994. $2,000

Jean'ne M. Shreeve, on behalf of the ACS Division of Fluorine Chemistry. George H. Cady Symposium on Fluorine Chemistry at the 207th ACS national meeting, San Diego, March 1994. $2,000

Donald W. Slocum, on behalf of Catalysis & Surface Science Secretariat, Divisions of Petroleum Chemistry Inc. and of Industrial & Engineering Chemistry Inc. Methane and Alkane Conversion Chemistry at the 207th ACS national meeting, San Diego, March 1994. $2,000

Martin R. Tant, on behalf of the ACS Division of Polymeric Materials: Science & Engineering Inc. High-Temperature Properties and Applications of Polymers and Polymer Composites at the 207th ACS national meeting, San Diego, March 1994. $2,000

Patrick H. Vaccaro, on behalf of the ACS Division of Physical Chemistry. Modern Optical Tools for Probing Molecular Processes at the 207th ACS national meeting, San Diego, March 1994. $2,000

Mark L. Wells, on behalf of the ACS Division of Geochemistry Inc. Colloidal State in Seawater at the 207th ACS national meeting, San Diego, March 1994. $1,000

ACS-PRF Summer Research Supplements to Type AC Grants

Norman L. Allinger, U of Georgia. Ab Initio Calculation of Heats of Formation. $5,000

Richard Bersohn, Columbia U. Tests of Mode-Selective Chemistry in Polyatomic Molecules. $5,000

William H. Breckenridge, U of Utah. Spectroscopic Studies of the Electronic Interactions of Ground- and Excited-State Atoms with Small Molecules. $5,000

Carlton E. Brett, U of Rochester. Dynamic Stratigraphy, Physical Sedimentology, and Paleoecology of Mid-Paleozoic Black Shales of the Northern Appalachian Basin. $5,000

Kenneth G. Caulton, Indiana U. Pi-Donor-Stabilized Unsaturation: Principles and Applications. $5,000

Valerian T. D'Souza, U of Missouri, St. Louis. Novel Cyclodextrins: Synthesis and Properties. $5,000

Steven G. Driese, Claudia I. Mora, U of Tennessee. Stable Isotope Composition of Pedogenic Carbonate in Central and Southern Appalachian Red-Bed Sequences: Monitor of Elevated P_{CO_2} during the Paleozoic? $5,000

Richard S. Givens, U of Kansas. Mechanistic and Exploratory Investigations of Hydroperoxyester-Induced Chemiluminescence. $5,000

Robert R. Holmes, U of Massachusetts. Hypervalent Cyclic Oxyphosphoranes as Catalytic Reaction Intermediates. $5,000

Bernard Kirtman, U of California, Santa Barbara. Accurate Calculation of Electron Correlation, Nonresonant Frequency Dispersion, and Vibrational Distortion Effects on Nonlinear Optical Properties of Conjugated Polymers. $5,000

Kenneth B. Lipkowitz, Indiana U-Purdue U, Indianapolis. Enantiodiscrimination on Chiral Polymers. $5,000

James M. Lisy, U of Illinois, Urbana-Champaign. Effect of Hydrogen Bonding on Vibrational Transition Moments. $5,000

Austin Long, U of Arizona. Stable Chlorine Isotopes as Indicators of Source and/or Evolution of Basin Brine. $5,000

J. Casey Moore, U of California, Santa Cruz. Faulting, Dolomitization, and Fluid Migration in the Monterey Formation in the Santa Maria Basin, California. $5,000

George R. Newkome, U of South Florida. Metallospheres and Superclusters: Preparation of Cascade Mediomolecules Possessing Interior Metal Centers. $5,000

John P. Oliver, Wayne State U. Synthesis, Nuclear Magnetic Resonance, and Structural Studies on Organoaluminum Compounds. $5,000

Arnold L. Rheingold, U of Delaware. Diphosphenes and Diarsenes in Cluster Synthesis: Preparation of Metal/Main-Group Multiple Bonds. $5,000

Paul W. Schmidt, U of Missouri, Columbia. Small-Angle X-ray Scattering Studies of Processes on Pore Surfaces. $5,000

Johannes Smid, State U of New York, C of Environmental Science & Forestry. Novel Amphiphilic Hydrogels with Immobilized Cation-Chelating Ligands. $5,000

ACS-PRF Summer Research Supplements to Type B Grants

Timothy W. Hanks, Furman U. Polymerization of Transition-Metal Complexes Containing Heterocyclic Ligands. $5,000

Rabindra N. Roy, Drury C. Thermodynamic Study of Electrolyte Mixtures. $5,000

ACS-PRF Summer Research Supplements to Type C Grants

Harry L. Frisch, State U of New York, Albany. Chemical Physics. $5,000

ACS-PRF Summer Research Supplements to Type G Grants

Mary K. Boyd, Loyola U of Chicago. Photochemistry of 9-Xanthylium Ions. $5,000

Erik J. Fernandez, U of Virginia. Magnetic Resonance Imaging Analysis of Miscible Viscous Fingering in Porous Media. $5,000

Philip D. Hampton, U of New Mexico. Magnetic and Conductive Properties of Metallo-Tripos Polymers. $5,000

Steven P. Nolan, U of New Orleans. Thermochemistry of Olefin Iron Carbonyl Complexes: Thermochemistry Related to Olefin Catalysis. $5,000

Piotr Piotrowiak, U of New Orleans. Intramolecular Excitation Transfer Bands. $5,000

Bradley D. Smith, U of Notre Dame. Synthesis and Study of Photoresponsive Receptors and Catalysts. $5,000

Jing Li, Rutgers, State U of New Jersey. A New Class of Solid-State Materials: Synthesis, Structure, and Electronic Properties of Novel Quaternary Transition-Metal Telluride Compounds. $5,000

ACS ombudsman

As a service to members of the American Chemical Society, an ACS staff office of ombudsman, which was established in 1976, provides a focal point for members to voice ideas and concerns, and primarily to solve nonroutine customer service problems. For such matters, please contact the ACS ombudsman by phone at (800) ACS-5558, select 5, then 4; or write to 1155—16th St., N.W., Washington, D.C. 20036. Members are also reminded that society councilors and directors are available to hear and act upon complaints and requests.

Call for papers for fluorine conference

The ACS Division of Fluorine Chemistry will hold the 12th Winter Fluorine Conference at the Tradewinds Hotel in St. Petersburg Beach, Fla., Jan. 22–27, 1995. Papers are being solicited in all areas of fluorine chemistry for both oral and poster presentations. Any paper that is submitted for consideration must be accompanied by both a 150-word abstract and a 1,000-word abstract. Poster papers need only be accompanied by a 150-word abstract. Abstracts should be submitted on the standard ACS Abstract Form no later than Sept. 16. To submit an abstract or for additional information, contact general chairman Joseph S. Thrasher, University of Alabama, Department of Chemistry, P.O. Box 870336, Tuscaloosa, Ala. 35487; phone (205) 348-8434, fax (205) 348-8448 or (205) 348-9104. □

Nitric acid concentration specification change

The ACS Committee on Analytical Reagents revised the ACS specification range for nitric acid concentration from 69.0–71.0% to 68.0–70.0%. The action was taken to facilitate compliance with the new HM-181 packing group system that has been adopted by the Department of Transportation to be effective as of Oct. 1.

Currently, nitric acid with a concentration range of 69.0–71.0% is shipped in packages that meet packing group II requirements. The new regulations will require that nitric acid concentrations greater than 70% be shipped in packaging that meets the more stringent packing group I requirements.

Major volumes of nitric acid with a concentration of 70–71% are routinely shipped in 2.5-L bottles and 6.5-gal carboys. If the specifications had not been revised, significant changes in packaging would have had to have been made by Oct. 1. A similar specification change was approved by the Semiconductor Equipment & Materials International Organization during its July 19 Process Chemicals Committee meeting.

The change in specification means that the normal azeotrope of 68.4% nitric acid now falls within the ACS specification range. □

ACS journal chooses advisory board

The advisory board of the *Journal of Physical & Chemical Reference Data* has been appointed. New members are John Herron, Ronald N. Lee, and Joseph J. Villafranca. Continuing to serve are David W. Bonnell, Peder J. Estrup, Leonard V. Interrante, John C. Light, Sokrates Pantelides, and Wing Tsang. The terms of Thomas F. Koetzle and Edward W. Thomas have expired. A list of advisory board members for other ACS publications is in C&EN, May 16, page 53.